U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND – ARMAMENTS CENTER

Emphasize Supportability During S&T (Pre-MS B) – An Update

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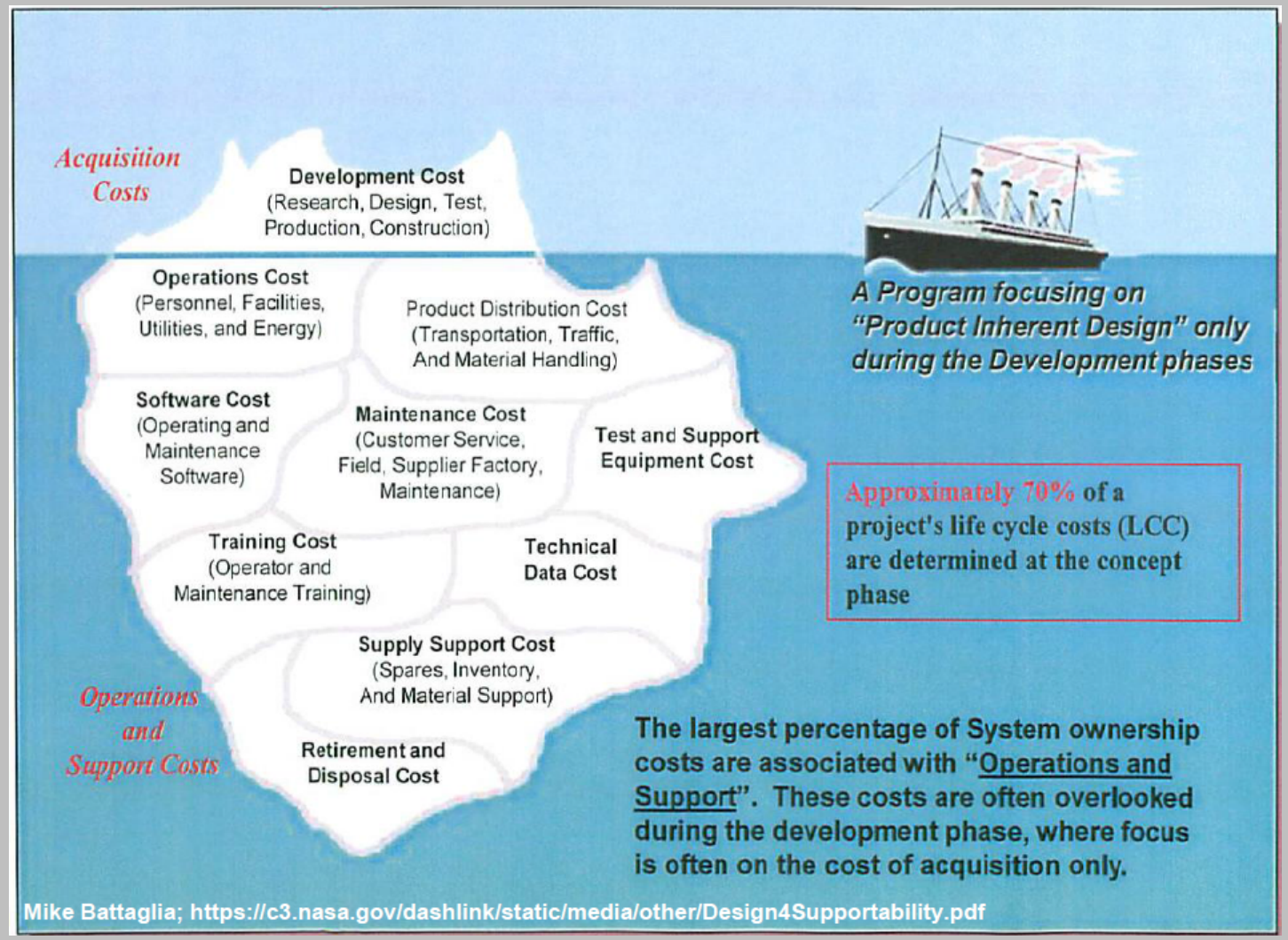
Agenda

- BLUF
- Purpose
- Supportability Analysis Framework: LOGMAP
- Supportability Analysis Web Tool: LCIAT
- Update: Progress on LCIAT
- Update: Progress on S&T Projects

BLUF

- Two years ago, as a first-ever effort, Combat Capabilities Development Command Armaments Center (CCDC Armaments Center) developed two initiatives to ensure logistics/supportability is addressed Pre-MS B
  - LOGMAP is a comprehensive supportability management framework for Science and Technology (S&T) projects
  - The Life Cycle Impact Analysis Tool (LCIAT) is a software tool used jointly with LOGMAP to address life cycle cost drivers
- **Benefits to all stakeholders:**
  - Enhanced sustainment planning/preparation – mitigation of Operation and Sustainment (O&S) risks
  - Increased customer satisfaction
  - Greater fidelity in developing alternatives in the trade space


Acquisition Costs
Development Cost
(Research, Design, Test, Production, Construction)
Operations Cost
(Personnel, Facilities, Utilities, and Energy)
Product Distribution Cost
(Transportation, Traffic, And Material Handling)
Software Cost
(Operating and Maintenance Software)
Maintenance Cost
(Customer Service, Field, Supplier Factory, Maintenance)
Test and Support Equipment Cost
Training Cost
(Operator and Maintenance Training)
Technical Data Cost
Supply Support Cost
(Spares, Inventory, And Material Support)
Operations and Support Costs
Retirement and Disposal Cost
A Program focusing on "Product Inherent Design" only during the Development phases
Approximately 70% of a project's life cycle costs (LCC) are determined at the concept phase
The largest percentage of System ownership costs are associated with "Operations and Support". These costs are often overlooked during the development phase, where focus is often on the cost of acquisition only.
Mike Battaglia; https://c3.nasa.gov/dashlink/static/media/other/Design4Supportability.pdf

Purpose

Purpose of This Initiative:

- Ensure logistic and supportability considerations are emphasized in CCDC Armaments Center S&T (Pre-MS B) projects
  - Currently a challenge for technology development projects to properly consider logistics/supportability elements
  - Incorporate the 12 product support elements Pre-MS B
- Integrate into the CCDC Armaments Center Technology Development (TD) Process
  - Details best business practices for maturing technology
- Allows for early identification of potential life cycle cost drivers/burdens
  - Allows the S&T project to design alternatives to lessen the burden the technology could impose once fielded/transitioned

LOGMAP

- Integrated into the CCDC Armaments Center Technology Development Process (ATDP)
  - ATDP systematically manages Pre-MS B TD project so requirements are well defined, quality engineering performed, and supportability elements analyzed earlier on
    - **Includes gate reviews to ensure project adherence to the ATDP**
  - Increases transition partner's (PM) confidence on the maturity (affordability) of the technology

- LOGMAP was developed to identify when supportability assessments should be conducted on CCDC Armaments Center S&T projects
  - Ensures logistics/supportability considerations addressed Pre-MS B
  - Tailored versions are developed to provide greater applicability and remove non-value added activities

Identifies which supportability assessments should be conducted prior to MS B - and when each should be conducted

LOGMAP

Benefits:

- Identifies supportability concerns upfront
  - ➢Can make changes to technology before design is finalized
  - ➢Provides greater fidelity to the trade space – identifying technology earlier so that costly redesigns can be avoided later on
- Provides a clearer picture of what to expect in O&S to PSMs
- Integrates CCDC Armaments Center supportability related entities into one POC (Supportability Project Officer) as the single point of contact for the integrated product team (IPT)

LOGMAP

Tailored LOGMAP:

- Identifies actions that are required, not required, or situational
- Identifies questions/information needed to analyze supportability impact of the design
- Reduces the cost and schedule impact to projects by including only essential supportability assessments

LOGMAP

Supportability's input into the S&T project

SME actions that influence design

CCDC Armaments Center TD processes needing supportability involvement

Tools/deliverables required for project execution

Study Projects

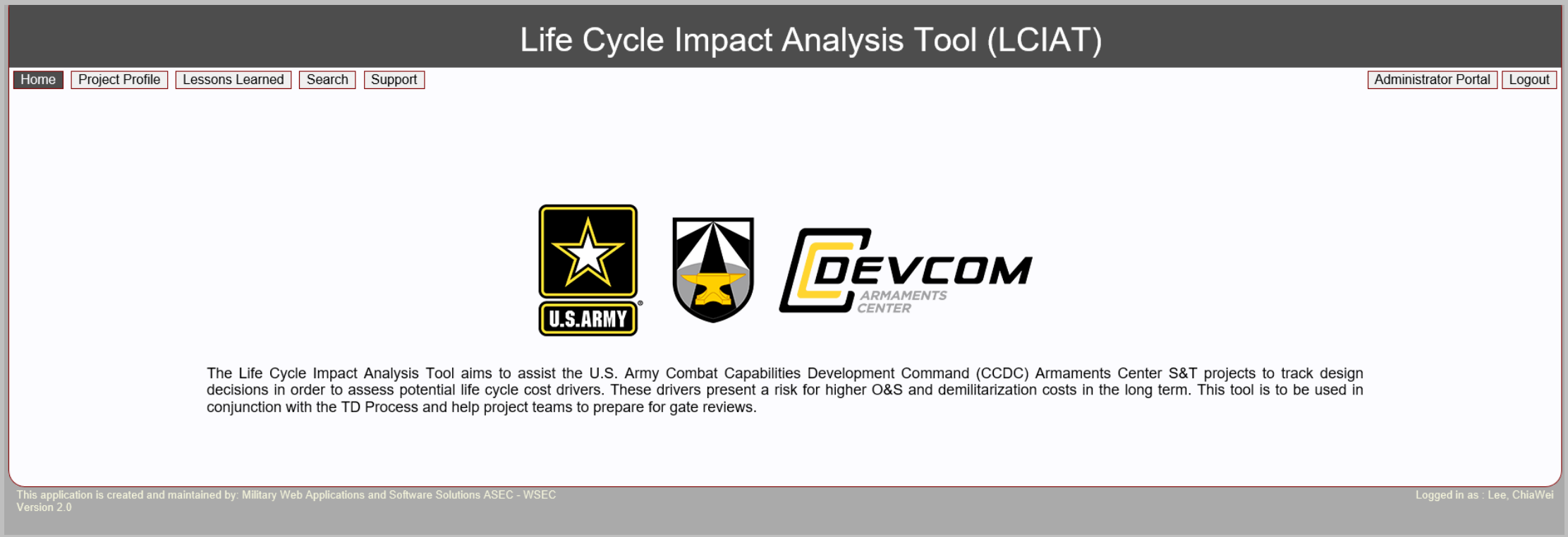
Applied Research Projects

Advanced Tech Development Projects

ManTech Projects

Tailoring aspect represented by color coded level of involvement

Life Cycle Impact Analysis Tool (LCIAT)



- Software tool to identify high risk areas for life cycle cost drivers
- Aids decision makers to make informed program decisions
- Allows project team to address life cycle cost drivers earlier in the life cycle (Pre-MS B)
- Web-based, question based, smart database

Enables early identification and resolution of potential life cycle cost drivers & burdens

Life Cycle Impact Analysis Tool (LCIAT)

LCIAT Deliverable – Potential O&S Impact Report

- Generated at major Gate and Technical Reviews

- Based upon a series of questions that are asked to the CCDC Armaments Center Project Officer (APO):
  - ➢Questions derived from the 12 Product Support Elements, ILA, IPS document, PSM Guidebook, and SME lessons learned

- Provides indicators on potential O&S impact areas/burdens the technology will have
  - ➢Provides decision makers with a tool to make informed choices
  - ➢Provides opportunity to begin trade-off analysis

- Implemented into LOGMAP framework and CCDC Armaments Center TD Process

Transportability (ILA 3-6.5)

Overall Indicator	Pre-gate 1	Pre-gate PDR	Pre-gate 2	Pre-gate 3	Pre-FTDR
Is the technology heavier than the analogous system?	Yes	Unknown/N.A.	Unknown/N.A.	No	No
Is the technology larger, by width and height, than the analogous system?	Yes	Yes	Yes	Unknown/N.A.	No
Does the technology require special transportation mode? For example, it can only be transported by xxx equipment.	Yes	Unknown/N.A.	Unknown/N.A.	No	No
Does the technology require any waiver for highway or rail transportation?			Unknown/N.A.	Unknown/N.A.	No

Manufacturing Sources and Materiel Shortages (ILA 3-3.3)

Overall Indicator	Pre-gate 1	Pre-gate PDR	Pre-gate 2	Pre-gate 3	Pre-FTDR
Does the technology require manufacturing capability that is dwindling in the US?		Yes	Yes	Unknown/N.A.	No

Supply Chain Management (ILA 3-4.2)

Overall Indicator	Pre-gate 1	Pre-gate PDR	Pre-gate 2	Pre-gate 3	Pre-FTDR
The technology has not yet considered the end-to-end logistics chain sustainment.		Yes	Yes	Unknown/N.A.	No

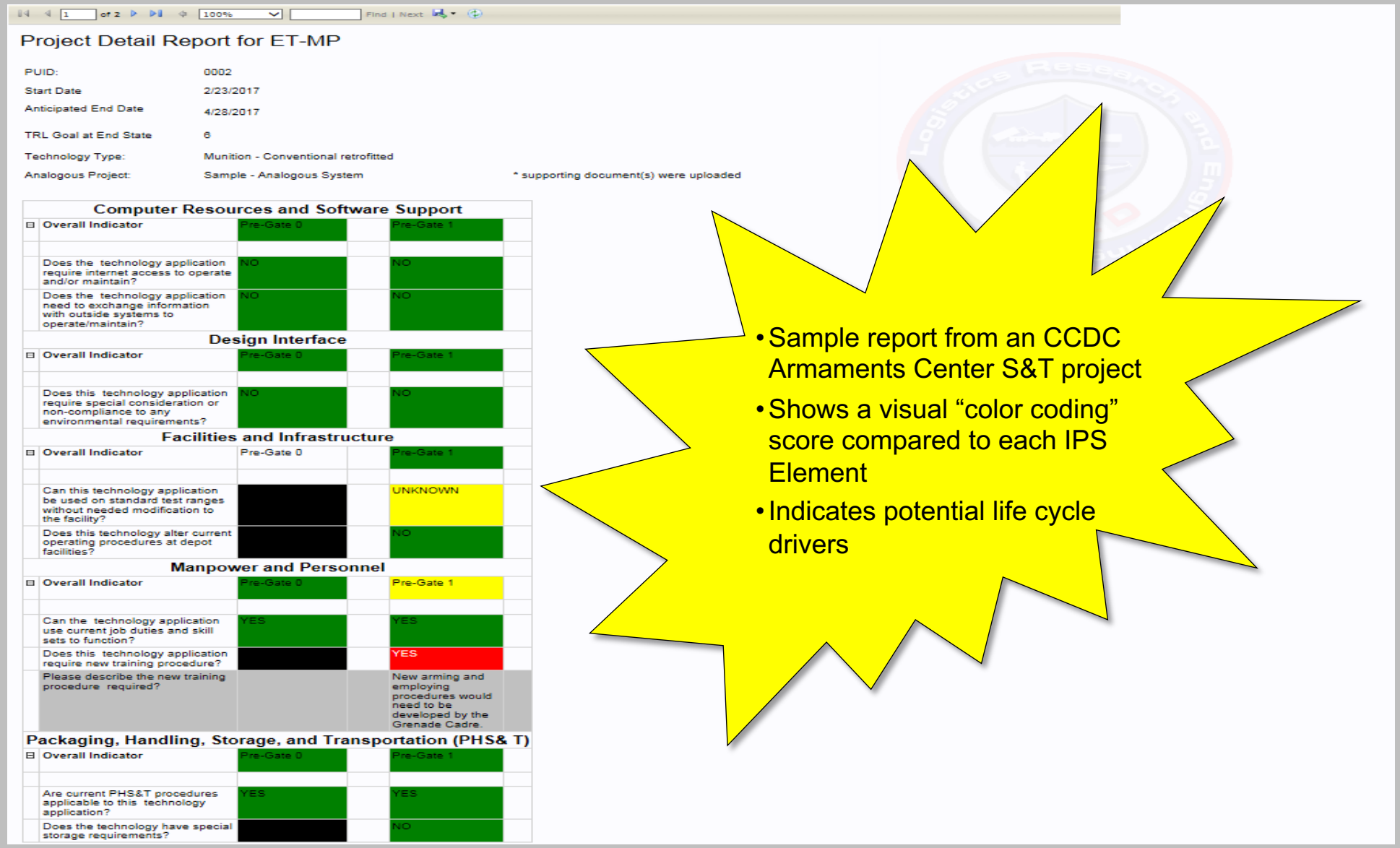
Packaging (ILA 3-6.2)

Overall Indicator	Pre-gate 1	Pre-gate PDR	Pre-gate 2	Pre-gate 3	Pre-FTDR
Does the technology contain hazardous material that require special packaging?		Yes	Yes	Unknown/N.A.	No

Handling (ILA 3-6.3)

Overall Indicator	Pre-gate 1	Pre-gate PDR	Pre-gate 2	Pre-gate 3	Pre-FTDR
Does the technology require special handling equipment that is not currently on the market during loading/unloading?		Yes	Yes	Unknown/N.A.	No

Life Cycle Impact Analysis Tool (LCIAT)



Project Detail Report for ET-MP

PUID:	0002
Start Date	2/23/2017
Anticipated End Date	4/28/2017
TRL Goal at End State	6
Technology Type:	Munition - Conventional retrofitted
Analogous Project:	Sample - Analogous System

* supporting document(s) were uploaded

Computer Resources and Software Support			
Overall Indicator	Pre-Gate 0		Pre-Gate 1
Does the technology application require internet access to operate and/or maintain?	NO		NO
Does the technology application need to exchange information with outside systems to operate/maintain?	NO		NO
Design Interface			
Overall Indicator	Pre-Gate 0		Pre-Gate 1
Does this technology application require special consideration or non-compliance to any environmental requirements?	NO		NO
Facilities and Infrastructure			
Overall Indicator	Pre-Gate 0		Pre-Gate 1
Can this technology application be used on standard test ranges without needed modification to the facility?			UNKNOWN
Does this technology alter current operating procedures at depot facilities?			NO
Manpower and Personnel			
Overall Indicator	Pre-Gate 0		Pre-Gate 1
Can the technology application use current job duties and skill sets to function?	YES		YES
Does this technology application require new training procedure?			YES
Please describe the new training procedure required?			New arming and employing procedures would need to be developed by the Grenade Cadre.
Packaging, Handling, Storage, and Transportation (PHS& T)			
Overall Indicator	Pre-Gate 0		Pre-Gate 1
Are current PHS&T procedures applicable to this technology application?	YES		YES
Does the technology have special storage requirements?			NO

- Sample report from an CCDC Armaments Center S&T project
- Shows a visual “color coding” score compared to each IPS Element
- Indicates potential life cycle drivers

Life Cycle Impact Analysis Tool (LCIAT)

Supply Support		
Overall Indicator	Pre-Gate 0	Pre-Gate 1
Does the technology application require spare parts?	NO	NO
Sustaining Engineering		
Overall Indicator	Pre-Gate 0	Pre-Gate 1
Are the materials the technology application is made from acquired from foreign countries?		NO
Technical Data Management		
Overall Indicator	Pre-Gate 0	Pre-Gate 1
Does the USG have data rights to the technology?	YES	YES
Describe rights secured /patents owned and what is needed still.	Patent pending for warhead design, patent expected Sep 2017	Patent pending for warhead design, patent expected Sep 2017
Is there planned approach for obtaining source data to prepare operational and maintenance documentation?	YES	YES
Please describe.	Government will own all tech data rights.	Government will own all tech data rights.
Support Equipment		
Overall Indicator	Pre-Gate 0	Pre-Gate 1
When compared to the most similar legacy system are there environmental constraints that reduce the use of the technology application?		NO
To operate or maintain this technology application, will it require other equipment outside of the purview of the current technology development effort?	NO	NO
Product Support Management		
Overall Indicator	Pre-Gate 0	Pre-Gate 1
Has there been a stakeholder analysis conducted to identify all sustainment stakeholders who will be affected by this technology application?	YES	YES
Have sustainment failure modes been identified for the technology application?	NO	NO
What is the mitigation strategy for this?	Revisit sustainment burden when item design is more defined.	Revisit sustainment burden when item design is more defined.
Have sustainment considerations been incorporated into the technology application requirements?	YES	YES
Does technology application support affordability constraints/goals of target system application?	YES	YES
Please identify potential contribution/impact if feasible.	Design currently meets PM defined cost target.	Design currently meets PM defined cost target.

- Questions filtered to ensure applicable content
- Visual progression of the technology's sustainment maturity through CCDC Armaments Center TD Process

Supportability Project Officers

- Supportability Project Officers (SPO)

  - Single Point of Contact for all supportability related questions and taskers
  - Utilizes LCIAT and LOGMAP to project proper assistance to S&T project teams
  - Communicate results and information collected (risks, FMEA, other concerns) to PSI and PSMs when program transitions to PM management

LCIAT Update

- LCIAT has successfully demonstrated and released the Block 2.0 module in 2018 (2.1 being worked on and will be released July 2019)
- Added additional features such as allowing “customers” to comment on specific supportability elements
- Has expanded beyond class V projects into class VII projects
- Incorporated the SML calculator to help projects determine SML maturity

S&T Project Update

- Successfully inserted “SPOs” into 12+ S&T projects, covering four Army Cross-Functional-Teams (CFTs)

  - Long Range Precision Fire
  - Next Generation Combat Vehicle
  - Future Vertical Lift
  - Soldier Lethality

S&T Project Update

- **Completed/In-Progress Analysis Areas:**
  - Packaging analysis and concepting earlier in the development life cycle
  - Resupply process analysis:
    - ✓ Manpower impact
    - ✓ Resupply conveyance
    - ✓ Process design
    - ✓ CONOP Discussion
  - Transportability Analysis
  - Risk Assessment and Management
  - Maintenance Considerations and Concepts
  - Storage Concerns and Facilities Requirement

Summary

- LOGMAP and LCIAT are two CCDC Armaments Center initiatives that provide a holistic approach on emphasizing logistic/supportability considerations on CCDC Armaments Center S&T projects
- Both tools provide beneficial impacts to all stakeholders involved
- Each initiative can be leveraged for use on any technology development (TD) effort
- LCIAT is continued to be matured, with more capabilities to be added
- 2017, involved in one S&T project. 2019, involved in more than 12 S&T projects, spanning four Army Modernization S&T CFTs

Implementing innovative processes and tools to build supportability into our products

LOGMAP and LCIAT Points of Contact

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